

Name: \_\_\_\_\_

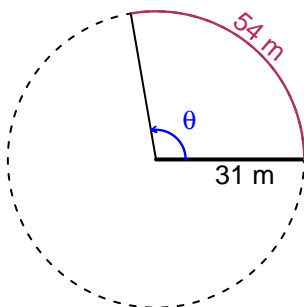
Date: \_\_\_\_\_

## Trig Final (SLTN v612)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

### Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 31 meters. The arc length is 54 meters. What is the angle measure in radians?

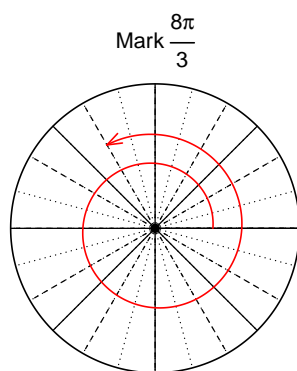


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$\theta = 1.742$  radians.

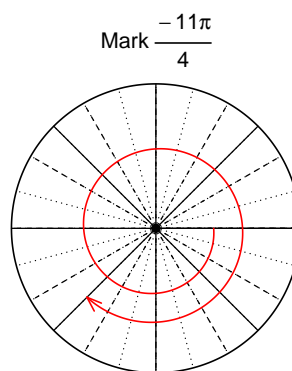
### Question 2

Consider angles  $\frac{8\pi}{3}$  and  $-\frac{11\pi}{4}$ . For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for  $\cos\left(\frac{8\pi}{3}\right)$  and  $\sin\left(-\frac{11\pi}{4}\right)$  by using a unit circle (provided separately).



Find  $\cos(8\pi/3)$

$$\cos(8\pi/3) = \frac{-1}{2}$$



Find  $\sin(-11\pi/4)$

$$\sin(-11\pi/4) = \frac{-\sqrt{2}}{2}$$

### Question 3

If  $\cos(\theta) = \frac{-11}{61}$ , and  $\theta$  is in quadrant II, determine an exact value for  $\sin(\theta)$ .

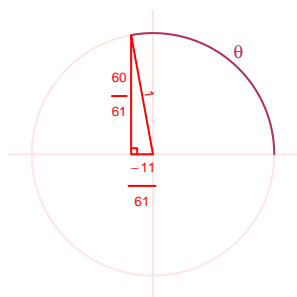
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}11^2 + B^2 &= 61^2 \\ B &= \sqrt{61^2 - 11^2} \\ B &= 60\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\sin(\theta) = \frac{60}{61}$$

### Question 4

A mass-spring system oscillates vertically with a frequency of 2.88 Hz, a midline at  $y = 6.59$  meters, and an amplitude of 5.54 meters. At  $t = 0$ , the mass is at the midline and moving up. Write an equation to model the height ( $y$  in meters) as a function of time ( $t$  in seconds).

Any of these equations would get full credit.

$$y = 5.54 \sin(2\pi 2.88t) + 6.59$$

or

$$y = 5.54 \sin(5.76\pi t) + 6.59$$

or

$$y = 5.54 \sin(18.1t) + 6.59$$